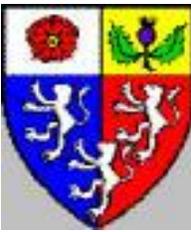


NAPSTER, EDF and the FDE



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@H4wkm0th



NAPSTER: NONLINEAR ANALYSIS AND PREDICTION STATISTICS FROM TIME-SERIES AND ENSEMBLE-FORECAST REALIZATIONS

A NERC FUNDED TECHNOLOGY TRANSFER PROJECT BY THE CENTRE FOR THE ANALYSIS OF TIME-SERIES AT THE LONDON SCHOOL OF ECONOMICS DEPARTMENT OF STATISTICS

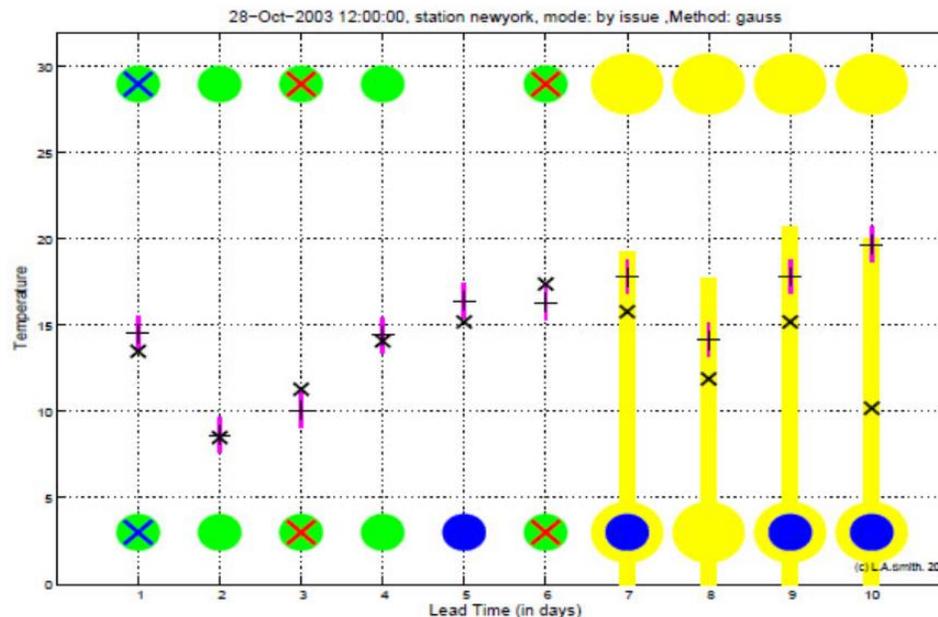


Figure 52: Daily FDE plots for NCEP hi resolution forecast at LAG for one degree error for likely success level 3 in 4 .

National Rail Enquiries

Wintry weather disruption (1)

Last updated 27/02/2018 00:31 [View all current disruptions](#)

Heavy snow is forecast for Britain

Train companies affected: c2c, Greater Anglia, London Overground, South Western Railway, Southeastern, Stansted Express, TFL Rail.

WINTRY WEATHER TO AFFECT UK JOURNEYS THIS WEEK

[Find out more](#)

[Journey planner](#)

[Live departure boards](#)

[Changes to train times](#)

[Get me home](#)

Problem Statement

- Risk Managers (internal) & Regulators (the law) requires we hold Reserve
- The level of Reserve varies with the forecast temp in week two (say LHR)
- The temp forecast for Thursday in week two bounces around, a lot
- The price of the Reserve moves with the forecast
- If one “chases the forecast” one risks buying and selling the same unit of reserve many times between now and next thursday: Buying high, Selling low
- Impact: EDF: “more than many” £100,000’s/year
- CallSO has a related challenge: \$26,000,000 in some years

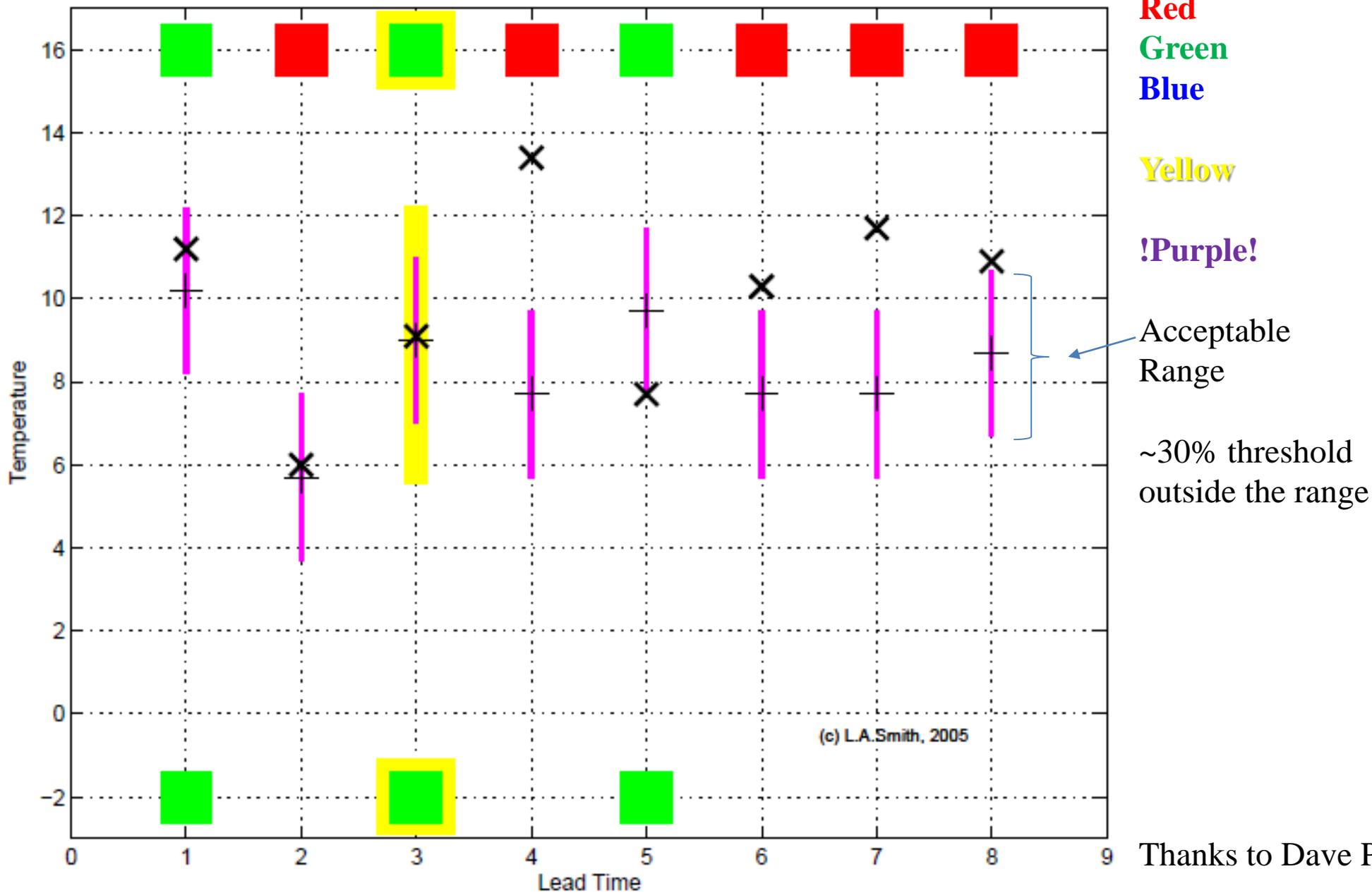
The weather is only one of many factors that change the price of Reserve; it is often **not** the main factor. Sometimes it is the overwhelming factor.

Approach

- **Before:** Traders look at all available information.
- **After:** Traders take a quick look at a bespoke screen to decide if weather is important to that trader today.
 - Ensembles & related “Probability” forecasts were obtained from another vendor
 - Exceeding a threshold chance of reality moving outside a range of interest flagged:
Blue: colder. Red: warmer. Yellow: Unusually high spread. Purple: Look Away.

If the ensemble forecast actually provided a probability **useful as such**, this task would be straightforward: one could provide reliable information for any threshold-chance, for any temperature range.

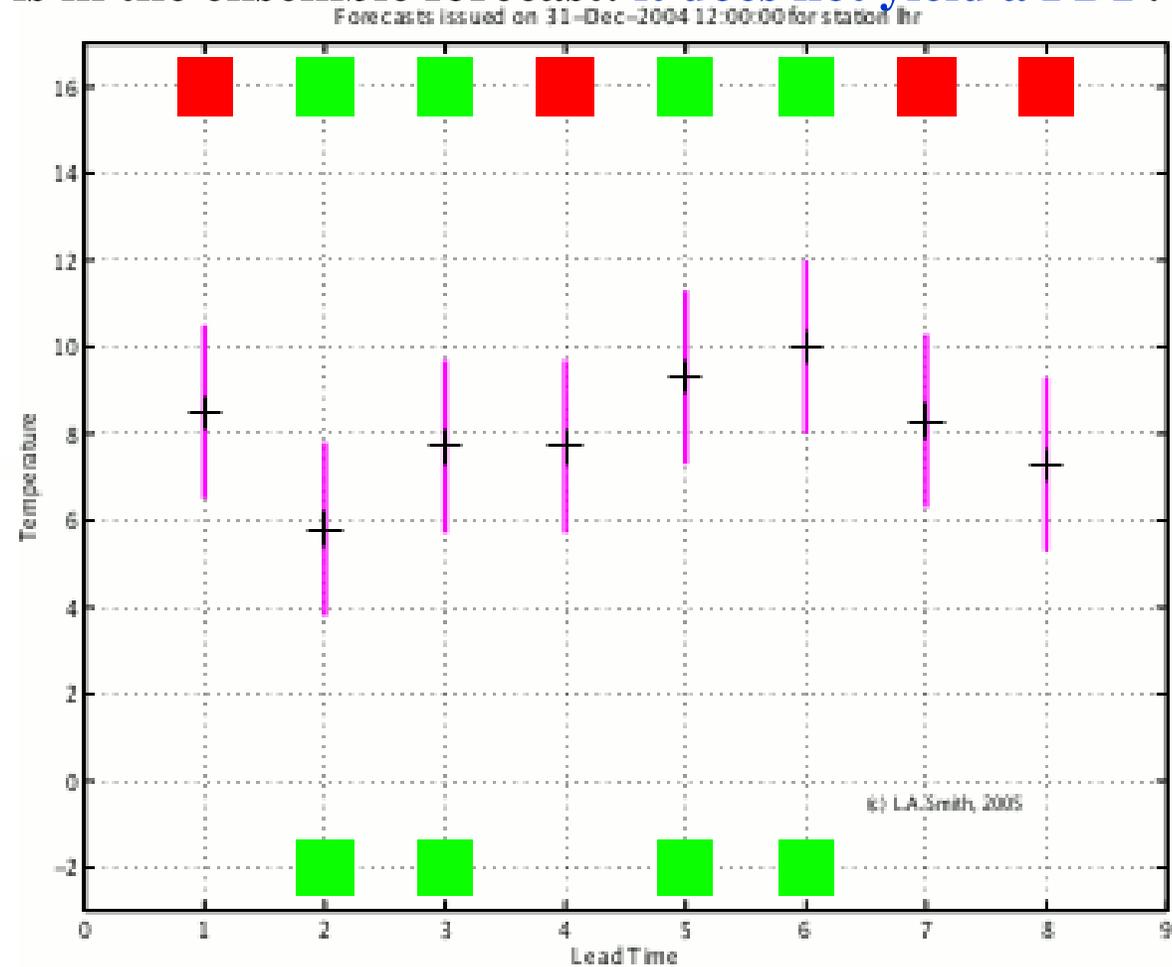
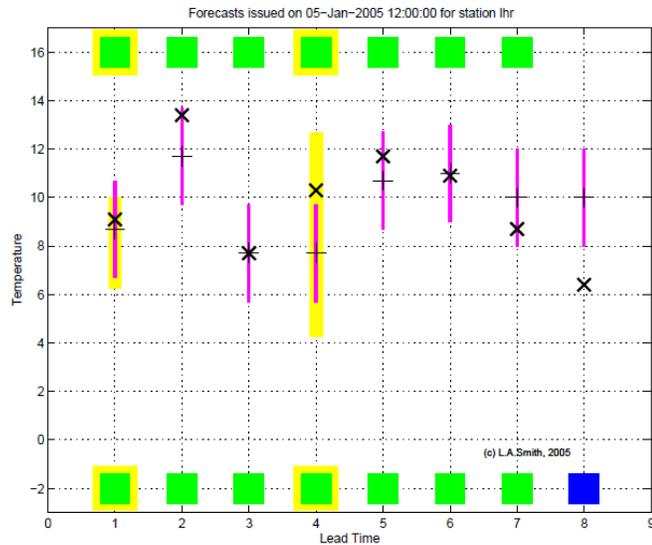
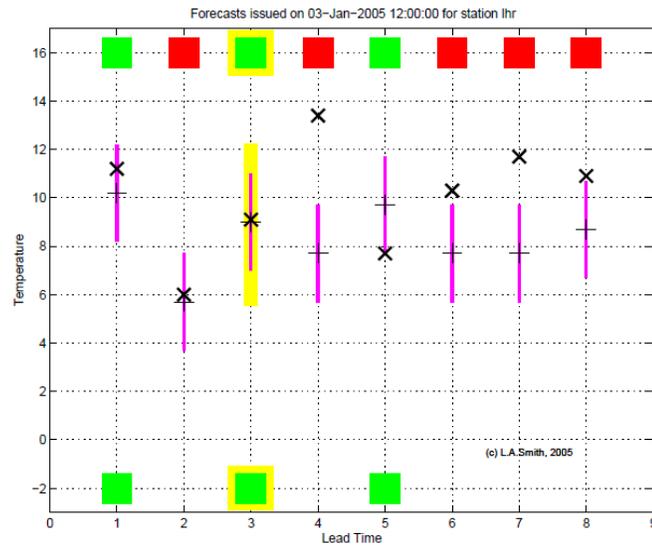
Forecasts issued on 03-Jan-2005 12:00:00 for station lhr



Thanks to Dave Parker



The point is we **cannot** do this for all thresholds and ranges; we extract only the information which is in the ensemble forecast: **it does not yield a PDF!**



Notice the “uncertainty storms”!
 Given an actionable PDF any threshold and tolerance could be extracted. Not so here!

Uncertainty Guidance

Smith, L.A. (2016) '[Integrating Information, Misinformation and Desire: Improved Weather-Risk Management for the Energy Sector](#)', in Aston, P.J., Mulholland, A.J. & Tant, K.M.M. (ed.) *UK Success Stories in Industrial Mathematics*, 289-296. Springer

- **Uncertainty Quantification is extraordinarily popular**
 - It tends, however, to aim for the **rigorous** thereby missing the **relevant**.
- **How are practitioners to interpret current forecast information probabilistically?**
 - It is irrational to interpret distributions as probabilities.
- **The focus should stay on the Practitioner's Question**
- **What are attractive alternative aims for simulation based forecasting if actionable probability forecasts are impossible to obtain?**

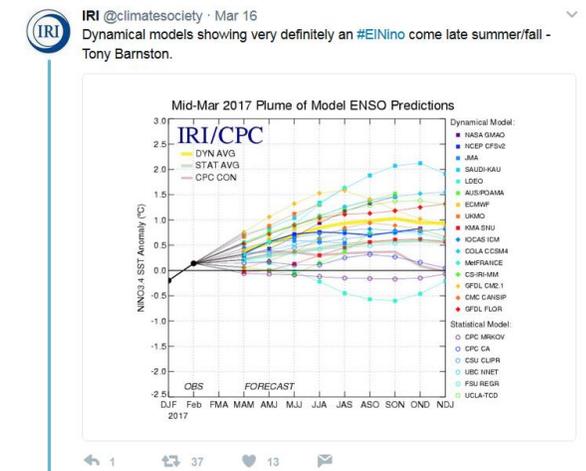
Results and Feedback

- How did the preceding uncertainty analysis inform decision making?
 - **Screen was recoded in-house and used**
- What challenges or limits did your organisation experience in implementing the decision-making process?
 - **Vender's focus on weather (rather than practitioner's question!)**
 - **Learned later that project might have been funded by risk managers, not trading side**
 - **Traders found a way to take on more risk using the yellow lights/ **uncertainty storms****
- How can the research community support improvements in your decision-making process?
 - **Stop claiming users just need to understand probability (practitioners are not stupid)**
 - **Stop claiming we can always give them **probabilities that are useful as such****
 - **Accept that the rules of the game, skill of the inputs and players change with time**
 - **Always include the **purple light****
 - **Generate Traceable Accounts of Uncertainty (as automatically as possible)**
 - **Aim to be happy with the decision process (even if disappointed in the outcome)**

We live in a target-rich environment.



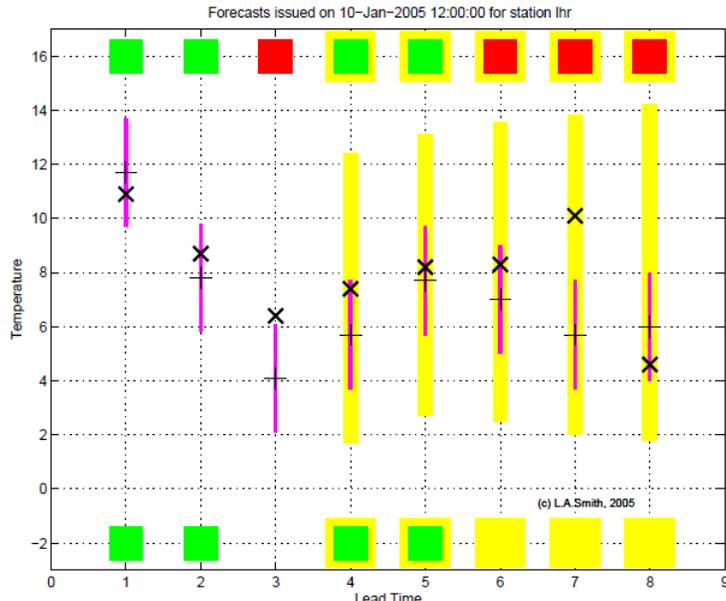
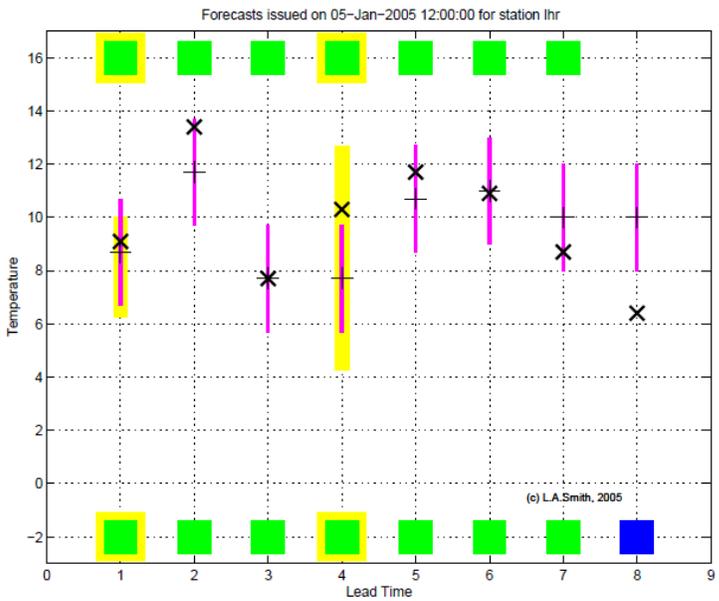
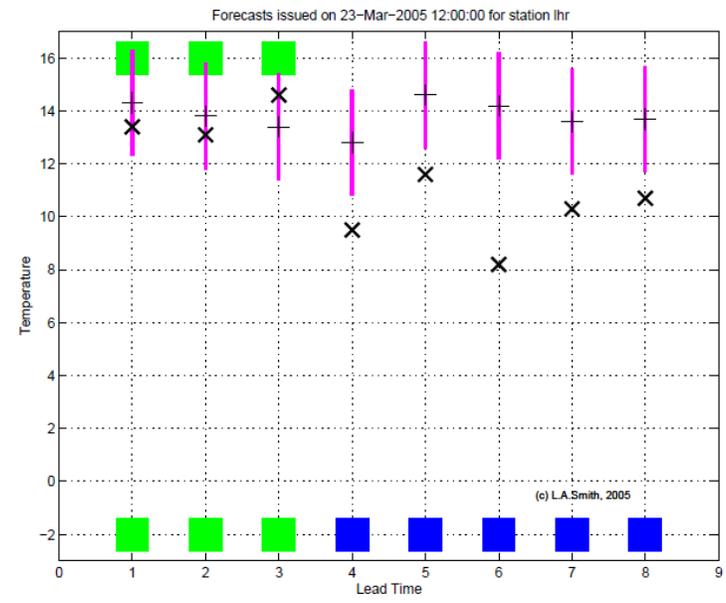
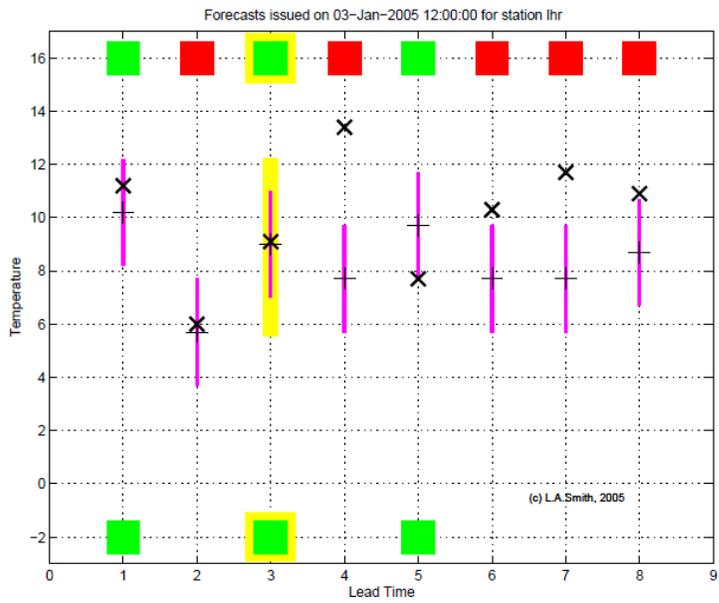
Smith, L.A. (2016) '[Integrating Information, Misinformation and Desire: Improved Weather-Risk Management for the Energy Sector](#)', in Aston, P.J., Mulholland, A.J. & Tant, K.M.M. (ed.) *UK Success Stories in Industrial Mathematics*, 289-296. Springer



Leonard Smith (@lynrdsmyth) replying to @climatesociety: [@sdessai](#) that's a nice model-land result; but what is the probability we do not have an el niño in the real world?

Avoid Confusing Model Diversity with Uncertainty of our Real-world Future?

@lynrdsmyth



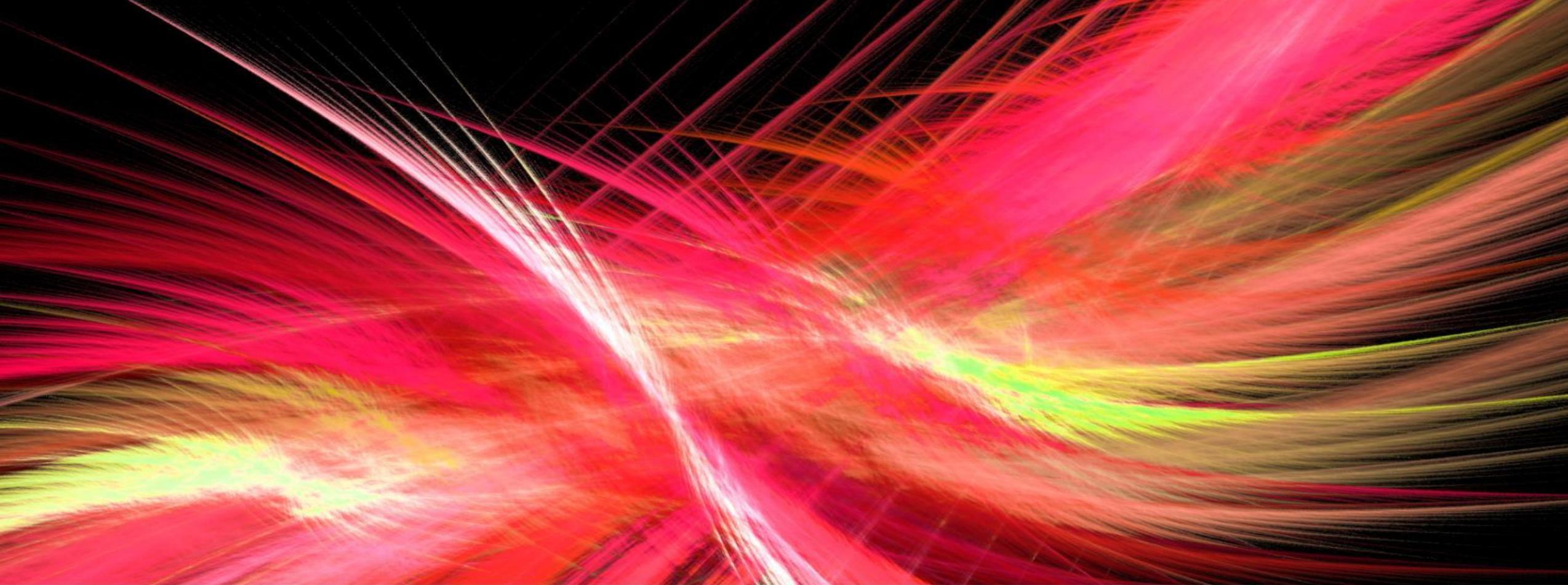
The future delivery of forest benefits: pressures from climate change, and pests and diseases

Michal Petr,
Forest Research,
Roslin, Scotland

- What problem does your organisation face?
 - Advice forestry with the “right” choice of suitable tree species which are **resilient and/or adaptive** to impacts from a) **climate change**, and b), **pests and diseases**, while providing multiple **benefits to the public and industry** (e.g. recreation and timber supply).
- How is this problem complicated by elements of uncertainty?
 - **Climate change** uncertainty – beliefs, and future impacts (with probabilities)
 - Pests and diseases **outbreaks** – impacts and pathways (introduction and spread)
 - **Long-term time horizons** – between 50 to 100 years
 - **Ambiguity** about the choice of tree species – trade-offs due to multiple benefits
 - **Types of forest management** – which and where the most appropriate
 - **Political uncertainty** – linked to changes in policies
- How significant is this problem for your team or organisation?
 - Can change the **composition of forests** and what **benefits** the public can gain
 - **“lead time”** for forest management actions to deliver expected benefits - can constrain what and when can be done

- How did/does your organisation make decisions in light of the uncertainty it faces?
 - As “evidence providers” we provide climate change information across multiple scenarios
 - We **collect new data** about, e.g. tree growth, to better understand how **trees are sensitive** to climate conditions
 - We develop **web-based multi-criteria decision tools**, which allow foresters to make informed decisions
 - We do **impact and sensitivity analysis** of tree species to climate conditions
 - We **learn from the past** (historical evidence) – across different sites and climate conditions
 - We **develop models** for ecological processes and

- What decision did your organisation make (informed by the uncertainty analysis)?
 - Changes in the **choice of suitable tree species in “vulnerable” areas** – based on tree species distribution models
- What challenges did your organisation experience in implementing the decision-making process?
 - It is hard to **communicate uncertainty** (complexity) when “customer” wants only **one value or key message**.
- How were the results of the decision-making process communicated to the decision makers?
 - We use a range of methods from web-based decision support tools, **bespoke analysis**, written reports/papers, and to **face-to-face communication**
- How could your decision-making process improve?
 - By continuous engagement with the customers to better **align our research with their work requirements**; manage expectations of our customers and **need for simplicity**
- How can the research do to support improvements in your decision-making process?
 - provide **information using standards** (e.g. data formats), which are easily translated into our tools and models; **Engage at the right level and time** with customers;



Decision framing and uncertainty network workshop

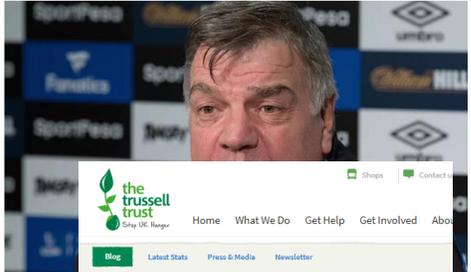
WARWICK
THE UNIVERSITY OF WARWICK

Food Security

Dr Martine J. Barons, University of Warwick,
Director, Applied Statistics & Risk Unit.

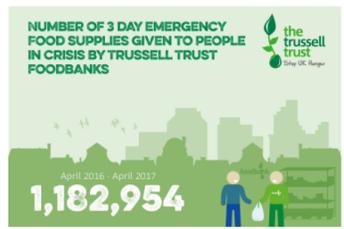
Sam Allardyce brands UK's reliance on foodbanks a 'disgrace'

- Everton manager sounds off after visit to North Liverpool foodbank
- 'People who are in work cannot afford to live at a decent level'



▲ Sam Allardyce, 1 need to exist in a c
 Sam Allardyce disgrace after
 Allardyce, top club to the W Liverpool have the Trussell 1 initiative. Th Europe, with poverty line.

25 APR 17 UK FOODBANK USE CONTINUES TO RISE
 UK foodbank use continues to rise as new report highlights growing impact of Universal Credit rollout on foodbanks.



- Over 1,182,000 three day emergency food supplies given to people in crisis in past year - 436,000 to children
- New report on Universal Credit reveals adverse side effects on people claiming and foodbanks providing help
- The Trussell Trust welcomes Damian Green's willingness to work with frontline charities and calls for more flexibility and support to help people moving to Universal Credit

UK foodbank use continues to rise according to new data from anti-poverty charity, The Trussell Trust. Between 1st April 2016 and 31st March 2017, The Trussell Trust's Foodbank Network provided 1,182,954 three day

Media Society Law Scotland Wales Northern Ireland

Hunger in Wirral: the truth behind the tale that made a Tory MP cry

Frank Field, whose story of a hungry constituent moved Heidi Allen to tears, says he is seeing destitution, not poverty



▲ Frank Field, centre, with volunteers filling Christmas hampers for Birkenhead's needy. Photograph: Christopher Thomond for the Guardian

It was the true story that moved a Tory to tears: Heidi Allen, Conservative MP for South Cambridgeshire, wept after Frank Field, the veteran Labour MP for Birkenhead in Wirral, told parliament of the hungry constituent who said he had had "a lucky week" because his family had been invited to a funeral and so could eat the food left over after the wake.

A few days later, Field was back in Birkenhead, immaculate in a checked shirt and tank top as he surveyed a scene of organised chaos in a sports hall at the Hive youth centre. Around him, volunteers scurried hither and thither to fill Christmas hampers for Wirral's most needy.

Early Warnings: Universal Credit and Foodbanks, highlights that although the introduction of Universal Credit has been piecemeal so far, food banks in areas of partial or full roll-out are reporting significant problems with its impact.

©Dr Martine J. Barons 2018

Food bank use across UK at record high, reveals report

Alarming rise in demand for three-day emergency food supplies comes amid 'significant problems' with roll-out of new Universal Credit system for administering benefits, warns charity

May Bulman | @maybulman | Web **Mirror**

Media Society Law Scotland Wales Northern Ireland

Reliance on food banks must not become the norm, says charity

Trussell Trust gave out enough emergency food to feed more than 1.1 million people last year, a slight increase on previous year



▲ A volunteer at a food bank. Photograph: Danny Lawson/PA

Britain's biggest food bank network has warned that reliance on charity food is in danger of becoming "the new normal" for low-income families in financial crisis.

The Trussell Trust, which oversees 424 food banks in the UK, said it gave out enough emergency food to feed more than 1.1 million people in 2015-16, a slight increase on the previous year.

The charity says the sharp increase in April 2013, when social welfare changes came into force.

Number of three-day emergency food supplies given by Trussell Trust foodbanks

Food banks ready to hand out 140,000 meals to hungry children this Easter in 'Breadline Britain'

Volunteers are ready to come to the rescue of thousands of children

most popular
 Jacinda Ardern's
 By Ben Glaze Deputy Political Editor
 21.00, 7 APR 2017 | 6 COMMENTS
 UPDATED 11:34, 4 APR 2017

'It's a life or death situation': why GPs are referring patients to food banks

Salford Foodbank has partnered with local medical practices to help provide care for vulnerable patients

- Do you work for the NHS? Please take our survey and tell us about your job. It should only take 10 minutes



▲ Langworthy medical centre has referred 263 patients to Salford Foodbank since 2014. Photograph: Leon Neal/Getty Images

The icy wind outside the Height medical practice in Salford is a clear sign to practice nurse Janice Hussey that she will be sending patients - stuck with the choice of eating or keeping warm - to the local food bank.

More than half of the practice's 4,000 registered patients are classed by GPs as "very deprived", with high rates of alcohol and drug problems, social isolation and homelessness. Increasingly, a referral to Salford Foodbank has become more crucial to their care than anything she can offer from her clinical training.

"It's a life-and-death situation with some patients," says Hussey. "Some can't take their medication without food, so they are going without that too because they cannot afford to eat. It drives me up the wall."



- RECOMMENDED
- Leicester ex-Blast flattened and home building collapsed - ball of flame four dead
 - Kendall Jenner completely pictures on Instagram I can't stop about one feature
 - Could Tupac LIVE in S... Rap star 'sp... years after



Why is the UK suddenly seeing hunger?

- How many are affected?
- What are the drivers?
- What are the household risk factors?
- What interventions are appropriate?
- What interventions will be effective?

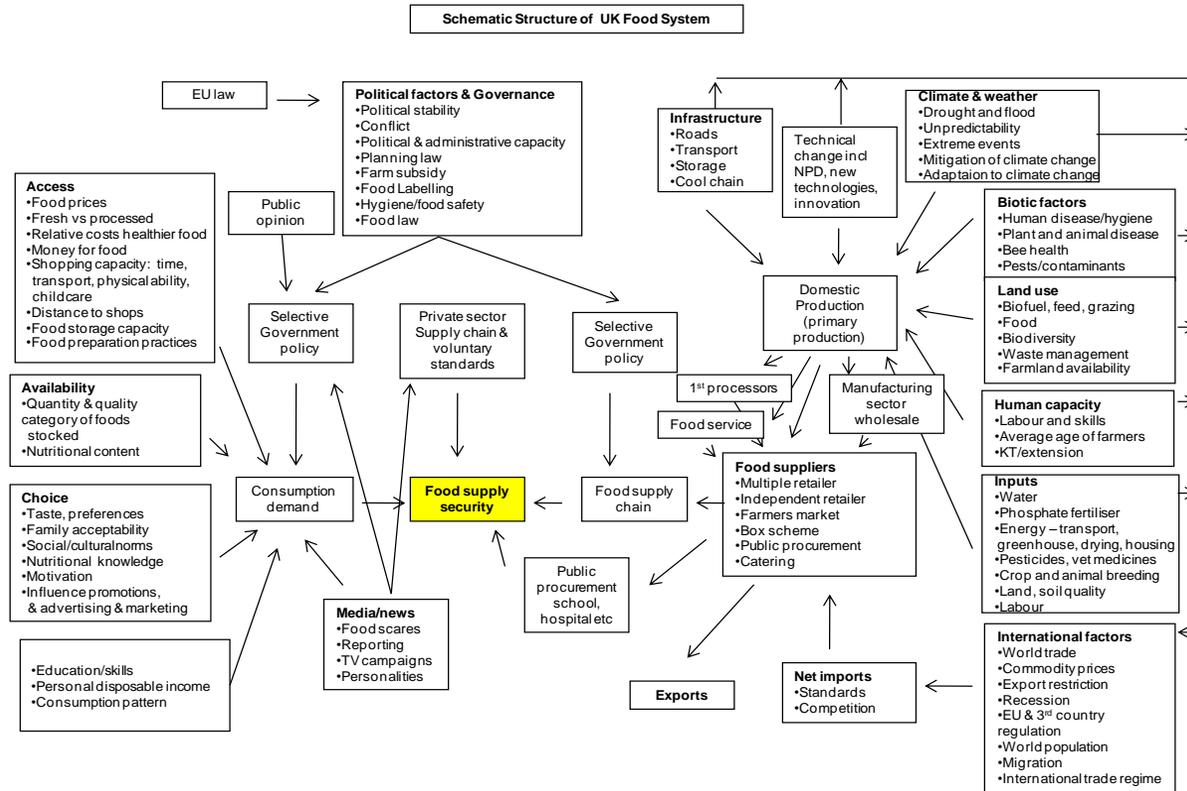
Performance of countries based on their 2017 food security score

1st	Ireland	85.6	84.4	86.5	85.8
2nd	United States	84.6	85.9	82.7	86.6
3rd	United Kingdom	84.2	82.1	87.2	81.0
4th	Singapore	84.0	91.3	79.5	78.3
5th	Australia	83.3	83.8	81.6	86.1

UK 13% marginally food secure 8% low or very low food secure	Australia estimated at 4% but likely underestimate as based on 1 question	USA 12.3% low or very low food secure 4.9% very low food secure	Canada 12.7% food insecure 2.6% severely food insecure 6.0% moderately food insecure
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<http://foodsecurityindex.eiu.com/Index>

Defra Project 2009: Identify reasons why food security may be an issue requiring specific attention



Coherent Frameworks for Statistical Inference serving Integrating Decision Support Systems

Jim Q. Smith[†], Martine J. Barons[†], and Manuele Leonelli[†]

[†]Department of Statistics, The University of Warwick

^{††}Instituto de Matemática, Universidade Federal do Rio de Janeiro

Abstract

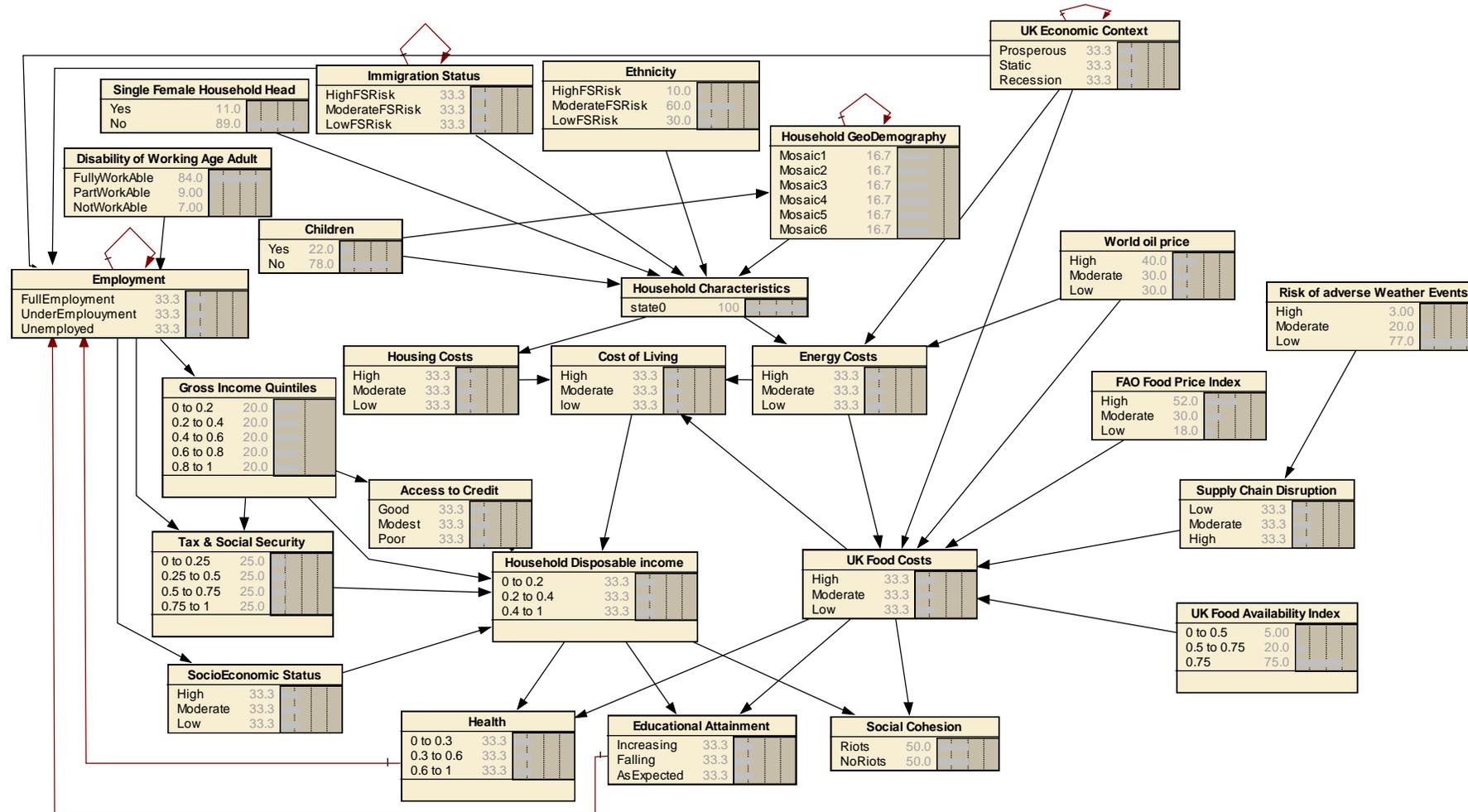
A subjective expected utility policy making centre managing complex, dynamic systems needs to draw on the expertise of a variety of disparate panels of experts and integrate this information coherently. To achieve this, diverse supporting probabilistic models need to be networked together, the output of one model providing the input to the next. In this paper we provide a technology for designing an integrating decision support system and to enable the centre to explore and compare the efficacy of different candidate policies. We develop a formal statistical methodology to underpin this tool. In particular, we derive sufficient conditions that ensure inference remains coherent before and after relevant evidence is accommodated into the system. The methodology is illustrated throughout using examples drawn from two decision support systems: one designed for nuclear emergency crisis management and the other to support policy makers in addressing the complex challenges of food poverty in the UK.

Keywords: Bayesian multi-agent models, causality, coherence, decision support, graphical models, likelihood separation.

1 Introduction

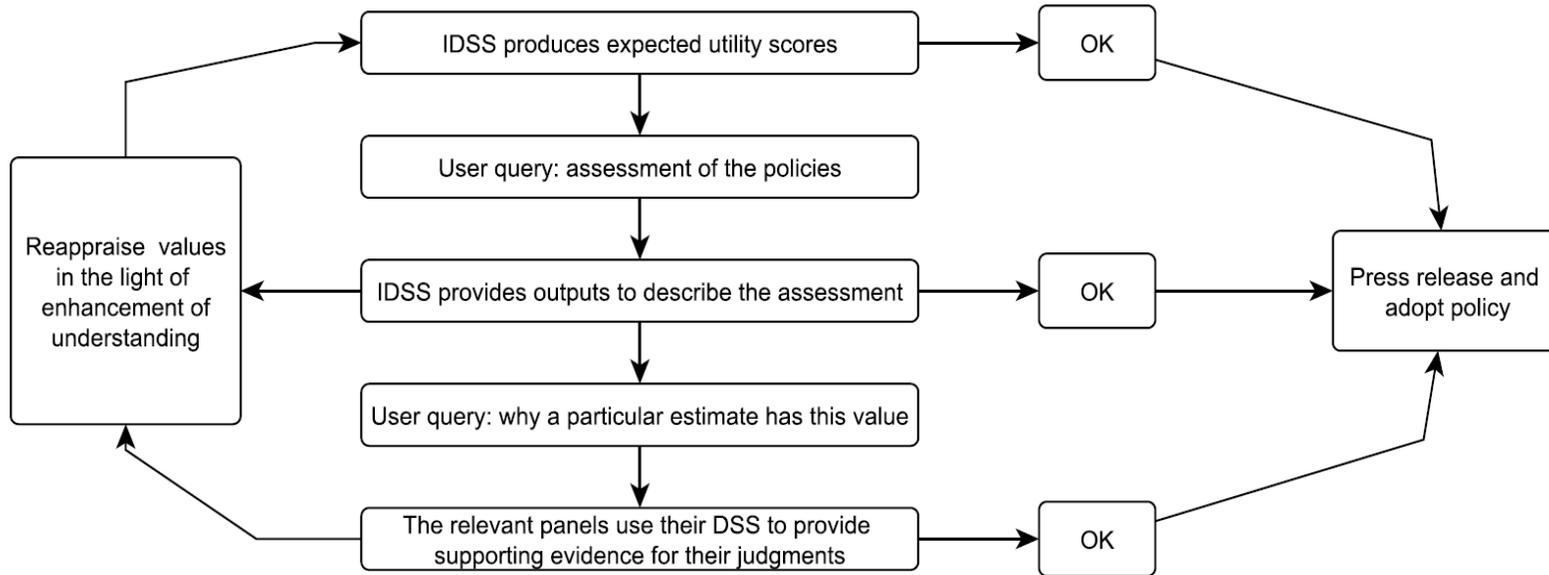
14v2 [stat.ME] 18 Dec 2015

Integrating Decision Support System (IDSS)



Panels of experts provide estimates (E.g. mean, variance) of future values under different policy options. Uncertainty propagated through law of total probability

IDSS

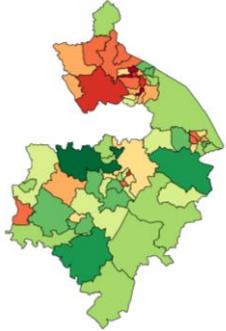


- Multiattribute utility scores for individual policies contribute to the decision-making
- 'White box' IDSS can be interrogated
- Sensitivity analysis for estimates of uncertainty or other queries

Figure: Manuele Leonelli & James Q. Smith (2015) Bayesian Decision Support for complex systems with many distributed experts Ann Op Res

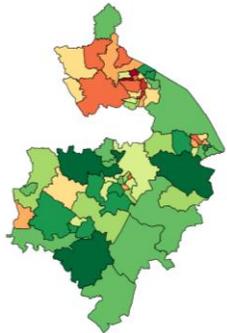
Communication

Warwickshire Policy A



Prosperity and deprivation

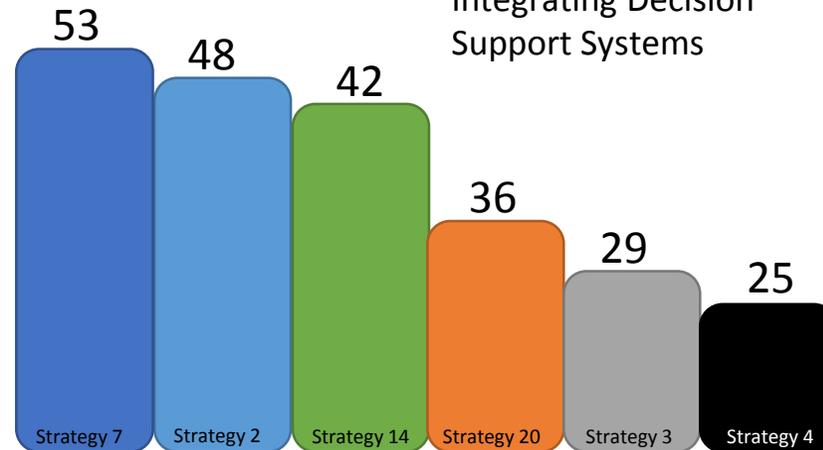
Warwickshire Policy B



Prosperity and deprivation

From: [Elicitation The Science and Art of Structuring Judgement](#)

CH17 Eliciting Probabilistic Judgements for Integrating Decision Support Systems



Strategy 7 is preferred to Strategy 2:

Strategy 7 provides lower *increase_in_food_poverty* than Strategy 2.

- This judgement takes into account the effects of *neagative_health_impact*, *reduced_educational_attainment*, *reduction_in_cost* and *reduced_social_cohesion*
- While *reduced_social_cohesion* is the main reason to prefer Strategy 2, this is outweighed by considerations of *neagative_health_impact* along with other less important factors, that provide reasons to prefer Strategy 7.

.....
reduction_in_cost :

reduction_in_cost is a factor favouring Strategy 7 over Strategy 2, although not a strong one
.....

4. Zulandi Van der Westhuizen

Problem Statement

- *Eskom, largest producer of electricity in Africa and one of top seven utilities globally with 52,000 employees and about £3,5B in assets*
- Electricity crisis in South Africa 2008, needed large scale additional generating capacity. Short term & long term solutions
- Complicated by the need to satisfy electricity needs, environmental concerns, financier requirements, regulatory uncertainty, customer / consumer concerns, affordability – energy trilemma
- Problem affected whole country, business confidence, risk ratings, economic growth

Approach

- Top 200 people in company gathered at out training facilities for 3 months full time
- Started strategy review process, scenario development, systems modelling, Eidos Parmenedis, think tool, surveys, financial modelling, SWOT analyses, optimisation modelling, forecasting and predictive analyses, sign posts / early warning systems – determined by ranges, option development, option evaluation, benefit/cost ratio, weighted scoring models, interactive visual analysis, various matrixes
- Various workstreams that looked at
 - Reputational risk
 - Financial risk
 - Country economic risk
 - Organisational risk
 - Operational and maintenance issues

Results and Feedback

- Through the windtunneling process, we could identify priority action areas and risk mitigating measures across the organisation.
- Scenario development helped us ensure that strategies from various areas and divisions are aligned.
- We were able to motivate and obtain a multi year price determination agreement with the government, which added certainty to the country, other industries and financiers.
- Eskom could align and negotiate its mandate form government, as well as have meaningful influence in the country's 5 year development plan and the national energy plan.
- Progress of divisional, new build and other operational strategies and planning could be tracked and monitored effectively and adjusted when needed.
- Results were published in a scenario publication, presentation, videos, strategic plan was communicated in slide decks with backing data and information in documents
- Reliable data from credible sources, robust analyses, visualisation tools, thinking tools, comparisons tools could assist.